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# *Agave vazquezgarciae* (Agavaceae), a New Species from Jalisco, Mexico

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**ABSTRACT.** *Agave vazquezgarciae* Cházaro & J. A. Lomelí, a new species from the Sierra de Manantlán Biosphere Reserve, Sierra de Cacoma, and Sierra de Cuale in southern Jalisco, Mexico, is described and illustrated. It belongs to subgenus *Littaea* (Tagliabue) Baker, group *Amolae*, and appears to be closely related to *A. pedunculifera* Trelease, which also occurs in western Mexico, including Jalisco. It differs from the latter in having a taller spike, much larger flowers, and firm, fibrous leaves that are narrower and have a larger, stouter terminal spine.

**RESUMEN.** Se describe e ilustra *Agave vazquezgarciae* Cházaro & J. A. Lomelí, especie nueva de la Reserva de la Biosfera Sierra de Manantlán, Sierra de Cacoma y la Sierra de Cuale en el sur de Jalisco, México. Pertenece al subgénero *Littaea* (Tagliabue) Baker, grupo *Amolae* y parece estar cercanamente relacionada a *A. pedunculifera* Trelease, la cual también habita en el oeste de México, incluyendo Jalisco. Difiere de ésta por una espiga más larga, flores mucho más grandes, hojas firmes, fibrosas y estrechas y espinas terminales más firmes y largas.

**Key words:** Agavaceae, *Agave*, century plant, Mexican endemic, protected natural areas, succulent plants, western Mexico.

*Agave* L. (Agavaceae) is an American genus of shrub-like multi-annual or perennial plants that produce leaves in basal rosettes and most of them bloom only once before dying (McVaugh, 1989). The genus was widely studied by Howard Scott Gentry, who published several books, one of them (1982) treating the taxa of

North America. However, observations made in both cultivated and wild material from western Mexico revealed the existence of a new species not included in Gentry (1982).

In 1983, José A. Lomelí went on a field trip to Sierra de Manantlán, in southern Jalisco, Mexico, with his students from the Universidad Autónoma de Guadalajara. While teaching vegetation types, he found an *Agave* (the so-called century plant) growing on rocks west of Rincón de Manantlán, and he brought three plantlets back to the Jorge Victor Eller Botanical Garden. After 18 years of cultivation in Guadalajara City, in January 2002, two of these agaves started blooming; that month M. Cházaro and O. Valencia visited the botanical garden, noticed the unfamiliar and interesting specimens, and suspected they belonged to an undescribed species.

Seeking this species, Cházaro and Valencia later that month visited Sierra de Manantlán. As they walked from Rincón de Manantlán village uphill to El Almeal, several plants were first seen, with the aid of binoculars, growing on rocky cliffs at 1800 m, ca. five of them in bloom. Further scrutiny of this plant in the wild confirmed the initial suspicion that it was, indeed, an undescribed species. This was quite a surprise, because Sierra de Manantlán, together with the Chamela Bay region, both in Jalisco, are among the most botanically explored areas in western Mexico (Lott, 1985, 1993; Vázquez-García et al., 1995; A. Vázquez-García, pers. comm., 2000).

A second field trip was carried it out by M. Cházaro and J. A. Vázquez-García in February 2002, a few kilometers west of Rincón de Manantlán, in order to collect the holotype and isotypes.



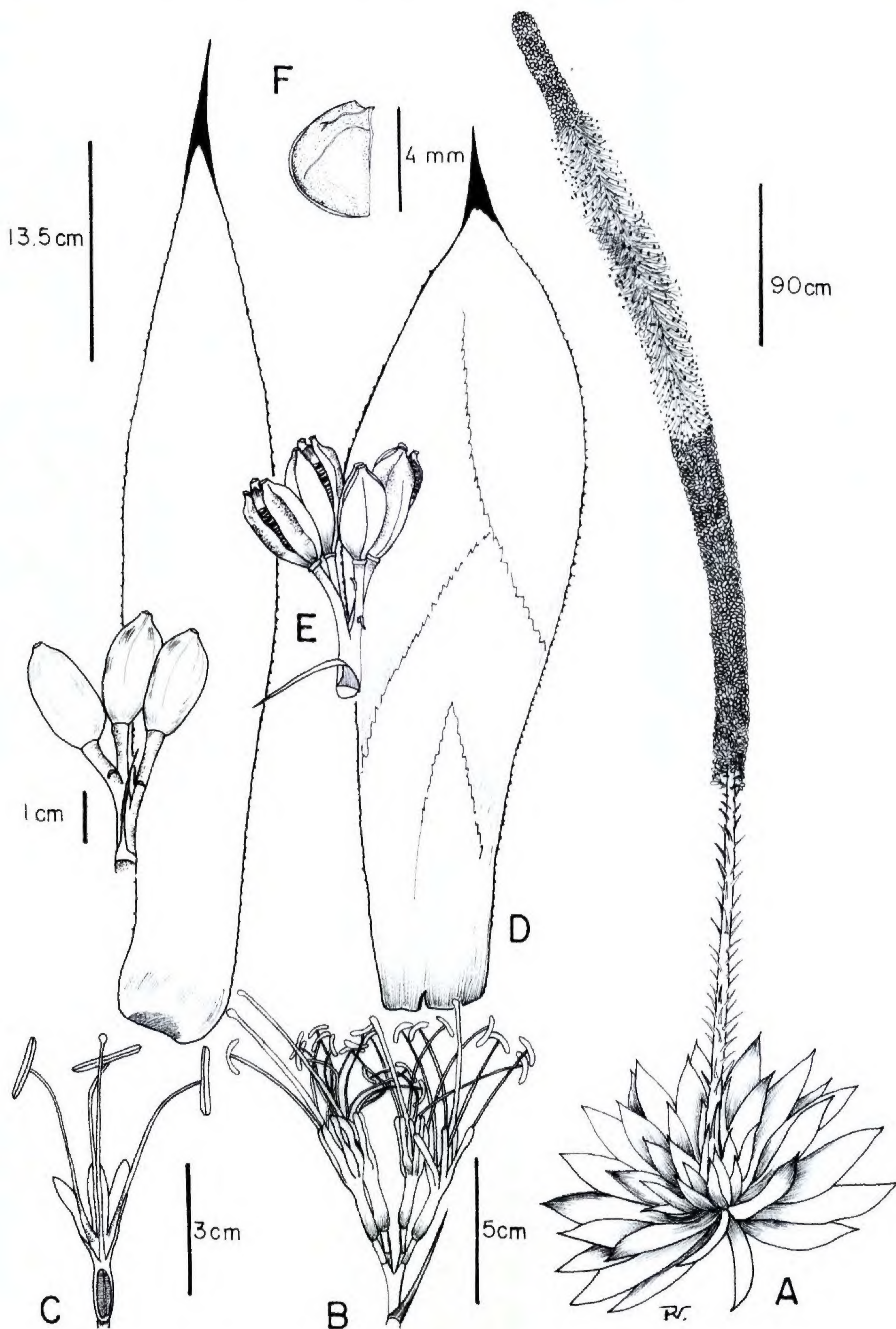


Figure 1. *Agave vazquezgarciae* Cházaro & J. A. Lomelí. —A. Flowering plant (drawing from a photograph). —B. Peduncle with four flowers. —C. Flower, longitudinal section. —D. Left, inner narrow leaf; right, basal wide leaf. —E. Peduncles with three immature (left) and four mature (right) capsules. —F. Seed, lateral view. All from J. A. Lomelí-Senci6n & M. Rodr guez s.n., 12 Nov. 1983 (GUADA), except for A and D (left) from the holotype Ch zaro & A. V zquez-Garc a 8172 (IBUG).

***Agave vazquezgarciae*** Ch zaro & J. A. Lomel , sp. nov. TYPE: Mexico. Jalisco: Mun. Cuautitl n de Garc a Barrag n, 2–3 km SW of Rinc n de Manantl n, 100 m from Toma de Agua, 1550 m,

8 Feb. 2002, M. Ch zaro-Bas  ez 8172 w/ A. V zquez-Garc a (holotype, IBUG; isotypes, GUADA, MEXU, MO, WIS, XAL, ZEA). Figure 1.



*Rosula acaulis*, simplex, symmetrica, (0.6)1–1.2 m alta et (0.9)1.7–1.8 m diam. Folia 4–9 dm longa et 9.5–16.8 cm alta, lanceolata vel anguste elliptica, fibrosa et succulenta; margo dentatus, dentibus duo ab cm, quoque dente 0.5–3 mm longo et 3.5–4 mm lato in basi; spina apice subulata, 4–6.5 cm longa. Spica erecta, racemosa, 5–7 m alta; bracteae lineares, coriaceae, 4.4–10.5 cm longae et 2 mm latae ad infimum; bracteolae 2–4 mm longae, pedunculus 1–1.4 cm longus; pedicelli 0.5–1.4 cm longi, dichotomi. Flores binati, viridi-flavi, 5.2–9.4 cm longi toti; tubus infundibuliformis 6–10 mm longus et 3–6 mm diam.; tepala erecta vel ascendencia, 1.6–2.2 cm longa et 5–6 mm lata; filamenta staminalia 4–7.2 cm longa; antherae 1.6–2.3 cm longae et 1.3–2 mm latae; ovarium 1.3–2.7 cm longum et 5–7 mm diam.; stylus 4.9–7.7 cm longus aequalis vel longior quam stamina. Capsulae binatae praeter proximales simplices abortu, 1.8–2.4 cm longae et 1–1.3 cm diam., oblongae-obovoidae; pericarpium stramineum; semina 3–4 mm longa et 2–3 mm lata.

Acaulescent, single, symmetrical, open rosettes, (0.9)1.7–1.8 m diam., (0.6)1–1.2 m in height, not suckering. Leaves 70 to 80 on each plant, pale green to glaucous, lanceolate or narrowly elliptic, 40–91 × 9.5–16.8 cm, indurate, fibrous and succulent, base gradually narrowed, acuminate, with a sigmoid shape 8–9 cm below the apex, tapering at apex to subulate, reddish to dark brown or blackened stout spine 4–6.5 cm, blade margin usually closely dentate with 2 teeth per cm, each tooth brown, 0.5–3 × 3.5–4 mm wide at base. Spike erect, racemose 5–7 m high, 25–30 cm diam. including flowers, rachis 10 cm diam. at base; bracts linear, 4.4–10.5 × 0.2 cm wide at base, surrounding half of the peduncle, coriaceous; bracteoles 2–4 mm; peduncle 1–1.4 cm with helicoid arrangement; pedicel 0.5–1.4 cm, dichotomous. Flowers geminate, greenish yellow, 5.2–9.4 cm, including the stamens; tube funnelform, 6–10 × 3–6 mm diam.; tepals erect or ascending, 1.6–2.2 × 0.5–0.6 cm; staminal filaments 4–7.2 cm, attached at the apex of tube; anthers 1.6–2.3 cm × 1.3–2 mm, arched after dehiscence; ovary 1.3–2.7 × 0.5–0.7 cm diam., style 4.9–7.7 cm, equal to or longer than the stamens. Capsules geminate except those of the proximal part of the inflorescence that are single by abortion, oblong-obovoid, 1.8–2.4 × 1–1.3 cm diam.; pericarp thin, pale brown, slightly apiculate, the apicule triangular-prismatic; seeds 3–4 × 2–3 mm.

*Common name and local uses.* “Mezcal,” “cola de zorra,” or “lechuguilla.” At Rincón de Manantlán it is reported (Rincón de Manantlán inhabitants, pers. comm., 2002) that fried flower buds are edible; they are called “bayusas.”

*Distribution.* *Agave vazquezgarciae* is currently known only from the northern slopes of the Sierra de Manantlán Biosphere Reserve and a portion of the neighboring mountain chains Sierra de Cacoma and

Sierra de Cuale, both in Jalisco, western Mexico, and included in the Sierra Madre del Sur physiographic province.

*Habitat.* Rupicolous on cliffs and slopes, from 1550 to 2100 m, pine-oak forest mixed with mesophytic elements. Associated species are *Chamaedorea pochutlensis* Liebm., *Equisetum myriochaetum* Schlechtendal & Chamisso, *Oncidium graminifolium* (Lindley) Lindley, *Tillandsia* L., and *Woodwardia spinulosa* Martius & Galeotti.

*Eponymy.* The specific epithet honors José Antonio Vázquez-García, from the Botanical Institute, University of Guadalajara, a scholar of Magnoliaceae and the ecology of the cloud forest in Mexico, who has devoted 25 years to the study of the flora of western Mexico. In addition, he explored and collected intensively in Sierra de Manantlán for 12 years (1984–1996). For these reasons, we deemed appropriate to name this species after him.

*Agave vazquezgarciae* belongs to subgenus *Littaea* (Tagliabue) Baker, which is characterized by its spicate-racemose flowers in small, distinct clusters, and the group *Amolae*, which is distinguished by the densely flowered spike, tepals ascending to partly outcurving, and tube generally shallow and much shorter than the tepals (Gentry, 1982). The new species is closely related to *A. pedunculifera* Trelease, as expressed in its multi-annual, acaulescent habit and shallow tubes. Material of *A. vazquezgarciae* previously had been erroneously referred to or was included within *A. pedunculifera* by several authors (Gentry, 1982; McVaugh, 1989; Vázquez-García et al., 1995). However, *A. pedunculifera* does not occur in Sierra de Manantlán Biosphere Reserve, Sierra de Cacoma, or Sierra de Cuale (Sierra Madre del Sur physiographic province); it occurs in Chiquilistlán municipality, in Eje Neovolcánico Transversal physiographic province.

*Agave vazquezgarciae* presents morphological characters, geographical distribution, rupicolous habit, and a habitat preference that are distinctive enough to warrant its recognition as a discrete species. *Agave vazquezgarciae* is distinguished by its prominent and stouter spine and by firm, dark, never glaucous marginal teeth in both juvenile and mature individuals. *Agave pedunculifera* usually has an inconspicuous, curled terminal spine and the marginal teeth are usually glaucous in both juvenile and mature specimens; very rarely, some leaves may have dark but brittle teeth. Although McVaugh (1989) found that marginal teeth may be present or absent in the same *A. pedunculifera* population, we found no support for his observation. In both *A. pedunculifera* and *A. vazquezgarciae*, we found that marginal teeth are



Table 1. Morphological differences between *Agave vazquezgarciae* and *A. pedunculifera*.

Character	<i>Agave vazquezgarciae</i>	<i>Agave pedunculifera</i> *
Leaves	lanceolate or narrowly elliptic, indurate and fibrous	ovate-acuminate or lanceolate, soft
Marginal teeth	brown and conspicuous; 2 per cm	glaucous and inconspicuous; 3 to 6 per cm
Terminal spine	4–6.5 cm, stout, reddish to dark brown	1–3 cm, weak, gray
Spike height, m	5–7	2–3
Bracts, form and texture	linear, coriaceous	usually triangular, soft
Bracts, length, cm	4.4–10.5	13–14
Bracts, width at base, mm	2	12
Total flower length, cm	5.2–9.4	3.9–4.4
Depth of tube, mm	6–10	≤ 6
Staminal filament length, cm	4–7.2	2.2–3.8
Style length	equal to or longer than stamens	shorter than stamens
Vegetation	pine-oak forest	tropical deciduous forest and pine-oak forest
Geographic distribution	Sierra de Manantlán, Sierra de Cacoma, and Sierra de Cuale	Chiquilistlán municipality, Eje Neovolcánico Transversal physiographic province

\* Measures for *Agave pedunculifera* taken from *Gentry 23371* (MEXU), *Gentry 5692* (DES), *Gentry & Arguelles 18182* (MEXU), *Rose 1713* (US), and *A. Vázquez-García & Y. L. Vargas-Rodríguez w/ Reynaldo Baltazar 7955 g* (IBUG).

always present in mature specimens, and we only saw the absence of teeth along young leaves produced months before blooming and located close to the spike. In addition, *A. vazquezgarciae* differs from *A. pedunculifera* in having firm, fibrous, lanceolate or narrowly elliptic leaves versus soft, ovate-acuminate or lanceolate leaves. *Agave vazquezgarciae* has brown marginal teeth and a conspicuous, stout terminal spine 4–6.5 cm long versus glaucous marginal teeth and an inconspicuous, curled terminal spine 1–3 cm long in *A. pedunculifera*. Furthermore, *A. vazquezgarciae* has flower parts that are generally longer than in *A. pedunculifera* (Table 1).

We hypothesize that the incursion of ancestral *Agave pedunculifera*–like stock into a more humid environment favored the speciation process, from which *A. vazquezgarciae* arose.

*Paratypes.* MEXICO. **Jalisco:** Mun. Cuautitlán de García Barragán, Rincón de Manantlán–La Cumbre, *M. Cházaro-Basañez 8167 w/ O. Valencia-Pelayo* (IBUG); cerro de Las Yeguas, W Rincón de Manantlán, *R. Guzmán & A. Valenzuela 6547* (IBUG); Cerro Las Yeguas, *H. Iltis 2552* (IBUG, WIS, ZEA); Cerro El Almeal, *H. Iltis 2717* (IBUG, IEB, MEXU, WIS, ZEA); Rincón de Manantlán, río después del Aserradero por el camino a Las Joyas, 12 Nov. 1983, *J. A. Lomelí-Sención & M. Rodríguez s.n.* (GUADA, IBUG, MEXU); SO de El Chante–Rincón de Manantlán, *H. Gentry 23507* (MICH); Mpio. Ayutla, Sierra de Cacoma, antes de Las Iglesias, rumbo a Ayutla, 14 Jan. 2006, *A. Vázquez-García 8601 w/ M. Cházaro-Basañez, O. Valencia & Y. L. Vargas-*

*Rodríguez* (IBUG, MO); Mpio. Talpa de Allende, Sierra de Cuale, predio Altamina, *A. Vázquez-García 7995 w/ T. Quintero, M. Mantilla, R. Murguía* (IBUG).

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